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25. (NEW) An electrical machine (2) with an externally situated stator and an inward disposed rotor which is rotationally supported on bearings and has a rotor shaft (4) which is rotationally fixed with a rotor laminate pack (18) and said rotor shaft (4) is hollow or, possesses between the rotor laminate pack (18) and itself a hollow interposed shaft (26), upon which the rotor laminate pack (18) is placed, wherein the rotor shaft (4) has a cross-sectional shape of three sickle shaped webs (46) which allow a large quantity of cooling medium to pass between the rotor shaft (4) and the interposed shaft (26), i.e. the rotor laminate pack (18), and allows formation of a large heat transfer surface with a simultaneous endurance to stress energy upon placing the rotor shaft (4) in the rotor laminate pack (18) or in the interposed shaft (26).

26. (NEW) The electrical machine (2) according to claim 25, wherein the rotor shaft (4) and the hollow, interposed shaft (26) contact one another only along a linear contact zone to form smaller heat transfer areas.

27. (NEW) The electrical machine (2) according to claim 25, wherein the webs are interrupted along their entire length so as not to lie upon the interposed shaft (26).

28. (NEW) The electrical machine (2) according to claim 25, wherein the rotor shaft (4) is made from one of a separate forged component and by a precision molding and is pressed into the hollow interposed shaft (26) to achieve a force fit.

29. (NEW) The electrical machine (2) according to claim 25, wherein the rotor shaft is made from a material of relatively low heat conductivity.

30. (NEW) The electrical machine (2) according to claim 29, wherein the material of relatively low heat conductivity is a highly alloyed steel.

31. (NEW) The electrical machine (2) according to claim 29, wherein the material of relatively low heat conductivity is titanium.

32. (NEW) The electrical machine (2) according to claim 25, wherein an element (34) is provided for a turbulence-free guided flow of the cooling medium.

33. (NEW) The electrical machine (2) according to claim 25, wherein the cooling medium is air.

34. (NEW) The electrical machine (2) according to claim 25, wherein for the construction of a rotor shaft (4), which can allow a large quantity of cooling medium to flow between the rotor shaft (4) and the interposed shaft (26) and yet be constructed, at the same time, with sufficient structural strength, and the cross-section of said rotor shaft (4) is in the shape of a star with four webs (28).

35. (NEW) The electrical machine (2) according to claim 25, wherein for the construction of a rotor shaft (4), which allows a large quantity of cooling medium to pass between the rotor shaft (4) and the interposed shaft (26) and for the provision of a relatively large heat transfer surface at the same acceptance of stress energy, the rotor shaft (4) is in the shape of three sickle shaped webs (46).

36. (NEW) The electrical machine (2) according to claim 25, wherein the webs (28, 46) are interrupted so as not to lie along their entire length against the interposed shaft (26).

37. (NEW) The electrical machine (2) according to claim 25, wherein the rotor shaft (4) is manufactured from one of a separate forged part and a precision cast part and is pressed into the hollow interposed shaft (26) to achieve a press fit.

38. (NEW) The electrical machine (2) according to claim 25, wherein the rotor shaft (4) is made from a material of relatively low heat conductivity.

39. (NEW) The electrical machine (2) according to claim 38, wherein the material of relatively low heat conductivity is a high alloy steel.

40. (NEW) The electrical machine (2) according to claim 38, wherein the material of relatively low heat conductivity is titanium.

41. (NEW) The electrical machine (2) according to claim 25, wherein elements (34) to facilitate non-turbulent flow of the cooling medium are provided.

42. (NEW) The electrical machine (2) according to claim 25, wherein a heat exchanger (36) is integrated into the electrical machine (2).

43. (NEW) The electrical machine (2) according to claim 42, wherein the heat exchanger (36) possesses cooling tubes (44, 48) which encompass the stator.

44. (NEW) The electrical machine (2) according to claim 43, wherein the cooling tubes (44, 48) are located in heat transferring connection with the cooling ribs (38).